

from 1858 to 1881. In 1875 he revised and edited a third edition of John Phillips's "Geology of the Yorkshire Coast." For many years he devoted all his spare time to the preparation of a list of British fossils, stratigraphically and zoologically arranged. Of this great work the first volume, dealing with the Palæozoic species, was published in 1888. Two other volumes, on the Mesozoic and Cainozoic fossils, have remained in MS. In all more than 18,000 species were catalogued.

In 1881 Mr. Etheridge, greatly to the regret of his colleagues on the Geological Survey, was appointed assistant keeper in the geological department of the British Museum, and this post he held with much advantage to that institution for ten years, when he retired from the public service.

He was elected a fellow of the Royal Society in 1871. In 1880 the Murchison medal of the Geological Society was awarded to him, and in the same year he was elected president of that Society. The two addresses which he delivered at successive anniversary meetings of the Geological Society were voluminous papers on the analysis and distribution of the British Palæozoic and Jurassic fossils.

These essays, which were based on his great catalogue, formed a foundation for a subsequent elaborate book (published in 1885) on "Stratigraphical Geology and Palæontology." This work, ostensibly issued as part ii. of a second edition of John Phillips's "Manual of Geology, Theoretical and Practical," was almost wholly re-written and very much enlarged by Mr. Etheridge, so that very little of the original text remained. No less than 116 tables of organic remains were incorporated, and very full particulars were also given of the strata in various parts of the British islands.

The stratigraphical knowledge which Mr. Etheridge acquired in his early days at Bristol, and afterwards with the field officers on the Geological Survey, qualified him to give expert advice on economic questions relating to coal, water-supply, &c. In consequence his assistance was frequently sought by engineers and others. During recent years he was engaged as geological adviser to the promoters of the Dover coal-boring, and was occupied on matters connected with it until but a short time before his decease.

A man of untiring energy and vigour, he seemed personally never to grow older, and it was not until lately that he lost his upright bearing, but he never lost the cheery, kindly disposition which endeared him to all his friends and associates.

He died after a few days' illness, the result of a chill, on December 18, soon after he had completed his eighty-fourth year. A good portrait of him was inserted by Lady Prestwich in the "Life and Letters of Sir Joseph Prestwich."

H. B. W.

NOTES.

It is announced that the committee of the Parisian Press Association has decided upon the award of the prize of 100,000 francs placed at its disposal by M. Osiris. The committee has resolved to divide this sum between the two inventions which have in recent times most contributed to the honour of French science. The sum of 60,000 francs has been awarded to Mme. Curie for the continuation of her researches into radium, and 40,000 francs to M. Branly for his labours in connection with wireless telegraphy.

THE sum of 30,000 francs has been placed at the disposal of Prof. d'Arsonval by the *Matin*, of Paris, in order to enable him to continue his researches in connection with the properties of radium.

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AMONG the numerous special kinds of radiation recently discovered, not the least interesting are the *n*-rays of M. Blondlot. These rays, which were first discovered in the radiations from incandescent bodies, pass readily through aluminium, glass, black paper, and other substances, but are arrested by lead or by moistened paper. They were at first studied by means of their action upon small electric sparks, but a more convenient means of observing them is due to their action upon feebly illuminated phosphorescent bodies, the luminosity of which is increased when the Blondlot rays fall on them. In a more recent paper, M. Blondlot has found that bodies in a state of strain, such as tempered steel and unannealed glass, give off these rays spontaneously and continuously at the ordinary temperature, and in the current number of the *Comptes rendus* M. A. Charpentier shows that these rays are also emitted by the human body, especially by the muscles and nerves. He points out that this effect may prove to be of the greatest importance in the case of the nerves, as up to the present no external reactions of the nervous system have been observed, and a new field of studies in physiology and medicine is thus opened up.

DR. OSANN, of Berlin, has been appointed professor of mechanics at Clausthal, and Dr. Kippenberger and Dr. Georg Frerichs have been appointed professors of chemistry in the University of Bonn.

THE Venetian Academy of Sciences, Letters and Arts, offers prizes of 3000 lire under the Querini-Stampaglia foundation for monographs on the following subjects:—The lakes of the Venetian district, treated from a physiographic and biological standpoint; the works of Manuzi as a critic of Greek and Latin literature; the origins of Venetian painting; and advances in the projective geometry of algebraic surfaces of two dimensions in space of *n* dimensions. Under the Cavalli foundation, a similar prize is offered for an essay on the effects of modern social and economic conditions, &c., on landlords and farmers, with especial reference to the Venetian provinces. Under the Balbi Valier foundation an award of the same amount is offered for advances in medicine or surgery for the period 1902–3, and under the Minich foundation a prize of 3000 lire is offered for embryological researches on the development of the larynx, the trachea, and the lungs in vertebrates and birds. The last day for sending in essays for the Stampaglia prize, on the Venetian lakes, and the Balbi Valier and Minich prizes is December 31, 1903; for the remaining prizes the essays are due at the end of subsequent years.

IN the course of excavations on the Lulworth Castle Estate, in Dorset, a number of bronze relics have been found, and have been sent to the Dorset County Museum on temporary loan. The most important object is a bronze sword, 24½ inches long, and, though broken, it is in a fine state of preservation. Other relics are a socket celt, a gold or heavily gilt bronze finger ring, a socket gouge, a hilt of a sword, an object which is believed to be one of the fittings of a car, supposed harness fittings, and a bronze crook.

THE following telegram was received from Mr. W. S. Bruce, leader of the Scottish Antarctic Expedition, at the offices in Edinburgh on December 17:—"Buenos Ayres. Scotia Stanley. December 2. Refitting here. Hydrograph surveyed 4000 miles unexplored ocean; 70° 25' south, 17 to 45 W.; 2700 fathoms trawled there; wintered Orkneys; detailed survey. Mossman and five men continue first-class meteorological, magnetical, biological station. Ramsay died August 6. All others robust; Scotia splendid.

Bruce." This is the first official information which has reached this country from the expedition. Mr. Allan Ramsay was the chief engineer.

It is reported by Reuter's Agency that a scientific expedition, organised by the anthropological section of the St. Louis Exhibition, is about to leave England for Central Africa under the direction of Mr. S. P. Verner. With reference to his journey, Mr. Verner is stated to have said that in order to get at the aboriginal life as little changed as possible by civilisation, it is desired to go out of the track of previous explorers and of all settlers. The base of operations will therefore be from the capital of Chief Ndombe, paramount chieftain of the Lunda tribes, at the head of navigation of the Kasai River, the largest southern tributary of the Congo, from which place an effort will be made to penetrate the interior.

A DESPATCH from Taganrog on December 15 states that the Sea of Azov has receded to such an extent during the past five days that the bed of the sea is visible for a distance of several versts. Taganrog is at the head of a bay of the extensive lagoon known as the Sea of Azov, and the depth of water in the roadstead is greatly modified by west and east winds. High winds are reported to have raised clouds of sand which have covered the town, and these are probably responsible for the exceptionally shallow water described in the despatch.

MR. R. I. POCKOCK has been elected to the post of superintendent of the Zoological Society's Gardens in succession to Mr. W. E. de Winton.

CAPTAIN STANLEY FLOWER, who was in England for a short time during the summer, has returned to his post at the Zoological Gardens, Giza, Egypt. He writes that the three specimens of the curious "shoe-bill" or "whale-headed stork" (*Balaeniceps rex*) received from the White Nile in 1902 are still in good health and condition in the Giza gardens. No living example of this rare bird has reached England since the arrival of Mr. Petherick's original specimens in 1860.

MR. W. EAGLE CLARKE, of the Museum of Science and Art at Edinburgh, a well-known authority on the migration of birds, passed a month during the migratory season in September and October last on board the lightship on the "Kentish Knock," which is situated in mid-sea off the mouth of the Thames, about twenty miles from land. Mr. Clarke has made a series of valuable observations on the various birds which passed by the lightship during this period, and has obtained many specimens which were killed by flying against the lantern. A full account of Mr. Clarke's experiences will be published in the next number of the *Ibis*.

It is understood that the authorities of the British Museum (Natural History) and the director of the Geological Survey of Egypt have agreed to the preparation of a joint report on the wonderful discoveries of fossil animals recently made in the Fayûm. Dr. Andrews will proceed to Egypt early next year to examine and catalogue the specimens in the Geological Museum at Cairo, but will not attempt to make further collections. A fine example of the skull of the horned *Arsinoitherium* (perhaps the most remarkable of all these discoveries) is now exhibited in the central hall of the Museum at South Kensington.

AMONG the contents of the second part of the *Bergen Museum Aarbog* for 1903 is a paper by Mr. H. Broch on

the hydroid polyps collected during the cruises of the exploring vessel *Michael Sars* in the North Sea from 1900 to 1902. Several new forms are named and described.

MR. RALPH S. LILLIE has found (*Amer. Journ. of Physiology*, viii., No. 4) that isolated cells and cell-nuclei suspended in cane-sugar solution through which an electric current is passed migrate in some cases with the negative, in others with the positive, stream. The majority of such structures migrate with the negative stream, and this tendency is especially strong in free nuclei and structures consisting chiefly of nuclear matter. Cells with voluminous cytoplasm, on the other hand, tend to move with the positive stream.

THE violets of Philadelphia afford to Mr. W. Stone the text for an article on racial variation in animals and plants, which appears in the October issue of the *Proceedings* of the Philadelphia Academy. In the course of this article the author directs attention to the growing practice among American zoologists of discarding the use of trinomials, and classing as a species every distinct animal form, no matter how slightly differentiated. This usage, it is urged, receives support from the methods of botanical classification. Where is all this splitting going to end? is the question which naturally arises in the minds of old-fashioned zoologists.

THE December number of the *Popular Science Monthly* contains two articles on biological subjects, the one, by Prof. T. H. Morgan, dealing with recent theories in regard to the determination of sex, and the other, by Dr. D. S. Jordan, on the salmon and salmon-streams of Alaska. Dr. Jordan recognises five species of Pacific salmon of the genus *Oncorhynchus* from these rivers, as well as three kinds of trout (inclusive of the now well-known rainbow-trout), and two other species belonging to other genera. As regards the salmon-tinning industry, the rivers of Alaska may be divided into three groups, king-salmon, red salmon, and humpbacked salmon streams. Those of the first class are the most important, but even these are less valuable than the corresponding rivers of British Columbia, owing to the fact that, from the shorter run, the fishes are nearer the spawning season when they enter, a larger proportion of them having white flesh in June than is the case with their Columbian brethren in August.

"THE GEOLOGY OF WORCESTER, MASSACHUSETTS," by Messrs. J. H. Perry and B. K. Emerson, has been issued by the Worcester Natural History Society (Worcester, Mass., 1903). It is a well illustrated work descriptive of the rocks and fossils of the county, and is written for those who have no technical knowledge of the subject. The interest is mainly petrological and mineralogical.

WE have received the general report on the operations of the Survey of India during 1901-2, prepared under the direction of Colonel Gore, Surveyor-General. Work has been carried on in the United Provinces, and also in the Shan States and Burma. The question of the condition of the existing topographic maps of the country has engaged serious attention, and it is admitted that more systematic arrangements must be made for their revision.

THE State of Indiana has issued in one volume (1903) the twenty-sixth and twenty-seventh annual reports for 1901 and 1902 of the Department of Geology and Natural Resources. Among the papers included is an important essay on the mineral waters of Indiana, by Mr. W. S. Blatchley, State geologist. He gives the location and describes the character of the waters of more than eighty wells and springs. Mr. Robert Hessler follows with an account of

the medicinal properties and uses of the waters. Mr. Blatchley deals also with the gold and diamonds of the State. Gold is widely disseminated in the Glacial Drift, but the occurrence of diamonds, which have been found while panning gold, is only of scientific interest. Mr. G. H. Ashley writes on the Lower Carboniferous area of southern Indiana, and directs attention to the economic products of the rocks, which comprise materials for good building stone, for the manufacture of Portland cement, and glass sands. There are also articles on the Orthoptera and Mollusca, and reports on the petroleum industry.

At the present time, when the British Cotton-growing Association is fostering the experiments which are being made to grow cotton in various parts of British Africa and in some of the West Indian islands, an account by the principal of the School of Agriculture in Cairo of the impressions gained during a visit to the cotton-growing States in America is particularly opportune. From a consideration of the principal characters of different cottons, and of the exclusive position which is held by Egyptian and South Sea island cotton, the writer shows that it is a matter of considerable importance to improve the quality as far as possible by taking advantage of selection and hybridisation. Practical suggestions are made with regard to the cultivation on the subjects of soil, planting, maturation of the seed, and rotation of crops.

DR. DIXON has added to his contributions towards the elucidation of the mode of ascent of water in tall trees by suggesting a transpiration model, which is described in the *Scientific Proceedings* of the Royal Dublin Society. Over the top of a thistle funnel are fixed two parchment diaphragms converted into semipermeable membranes by soaking first in gelatin and then in tannin. These are arranged so as to leave a small space in which sugar is placed before closing up. A continuous column of water is established from the membranes through the funnel and connections, to a supply of water below. The water enters the artificial cell, fills it, and finally water and sugar soak through the outer membrane. The vapour tension of the water below the lower membrane is greater than that of the liquid in the cell, and the latter is greater than the vapour tension of the liquid above the upper membrane, so that a flow of water takes place from the reservoir upwards.

THE *Transvaal Agricultural Journal*, which is issued quarterly, and has now reached its fifth number, serves to show with how much energy the Agricultural Department of the new colony, under the direction of Mr. F. B. Smith, is attacking the many problems of farming in that country. A more difficult task cannot well be imagined; the disasters of the war, which has denuded the country of its stock, have been accompanied by repeated attacks of epizootic diseases of all kinds, to which new importations of cattle succumb at once; at the same time the greatest drought since 1862 has occurred, and even Kafir labour has been forced up to a price prohibitive to the farmer. The numbers of the *Journal* bear evidence of the diversity and virulence of the diseases of stock that prevail; fortunately they show also that the Agricultural Department is busy with investigations on the origin of the diseases and the best preventive measures against them. The most dreaded diseases seem to be "red water" and the more recently discovered "Rhodesian red water" or "African coast fever," both of which are propagated by ticks as an intermediate host, but though animals get immunised or "salted" against the former, the latter seems invariably fatal.

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MESSRS. MACMILLAN AND CO., LTD., have published part v. of "A School Geometry," by Messrs. H. S. Hall and F. H. Stevens. This section contains the substance of Euclid Book vi., with additional theorems and examples.

MESSRS. DAWBARN AND WARD, LTD., have added to their series of useful little "Rural Handbooks" a volume by Mr. H. Francklin on incubating and rearing utility fowls. The principles on which incubators and rearers are constructed are explained, and the advantages of artificial as compared with natural incubation are made clear.

A COPY of the sixth edition of Strasburger's "Lehrbuch der Botanik" has been received from the publisher, Herr Gustav Fischer, Jena. The work has been completely revised, and many sections have been altered in order to adapt them to the present state of knowledge, especially in connection with plant physiology and morphology.

WE have received the year-book of meteorological observations at the station of the First Order belonging to the *Magdeburg Journal* for the year 1900. This is the twentieth volume of the series, and contains, in addition to observations and results recorded in accordance with the international scheme, complete hourly readings and means, observations of earth temperature, evaporation, &c. As regards tabular statements of the results of a well equipped observatory, nothing better could be desired. The autographic registrations of a Campbell-Stokes sunshine recorder have been photochemically reproduced; the cards ranged side by side have a very neat appearance, and give a clear view of the amount of bright sunshine in the different months. During the seven months of April to October there were only thirteen sunless days.

THE Christmas number of *Photography* (London: Iliffe and Sons, Ltd., price 1s.) is a production which will be heartily welcomed by those interested in the artistic side of photography. No pains seem to have been spared to render the book high class in every respect, and the thirty or more full-page and smaller half-tone reproductions from photographs printed on glazed art paper, and the letterpress and line drawings on rough antique paper, are sufficient proof of this statement. The contents of the letterpress consist of six articles on topics of widely different interest. Mr. F. H. Evans, on "The Characteristic Use of the Hands in Portraiture," gives some valuable hints on the conspicuous part played by the hands of sitters, and illustrates his remarks by photographs taken by himself. "Landscape in Pictorial Photography" is contributed by "Fecit," who in this delightful essay uses numerous illustrations of prominent photographers to elucidate his points. Other articles are "Photography in a Wood," by Mr. Will. A. Cadley; "W. Rawlings—a Photographer of Winter," by Monochrome; and, in a lighter vein, the "Walrus" gives an account of the weird inventions of "My Friend Choggles," and "Pettifer" prattles about his experiences of winter photography.

THE report of the ninth meeting of the Australasian Association for the Advancement of Science, held at Hobart, Tasmania, in 1902, has now been published. The volume is edited by Mr. Alex. Morton, the secretary of the Royal Society of Tasmania, and runs to nearly nine hundred pages. The contents of the report, including as they do detailed accounts of the ten sections into which for working purposes the Association is divided, and reports of eight research committees, show conclusively that the Australasian men of science are following very successfully the example set by the parent association. The presi-

dential address for 1902, by Captain F. W. Hutton, F.R.S., dealt with evolution and its teaching. We have also received a copy of the Walker memorial volume published by the Royal Society of Tasmania, and containing the papers on early Tasmania read before the Society during the years 1888-1899 by the late Mr. J. B. Walker, vice-chancellor of the Tasmanian University.

THE report of the U.S. National Museum for the year ending June 30, 1901, has just reached us from the Smithsonian Institution. Part i. of the volume (of 452 pages) contains the report of the assistant secretary and the reports of three head curators, a list of accessions to the museum, and a bibliography of the publications of the museum. The second part will, however, prove of more general interest, consisting as it does of five lavishly illustrated articles. These contributions are, first, a report describing the exhibit of the U.S. National Museum at the Pan-American Exposition at Buffalo in 1901, by Messrs. F. W. True, W. H. Holmes, and G. P. Merrill. This report is illustrated by seventy-two full-page plates, which it would be difficult to improve. Mr. W. H. Holmes also describes the flint implements and fossil remains from a sulphur spring at Afton, Indian Territory, this article being accompanied by twenty-six plates; and the same author deals with the classification and arrangement of the exhibits of an anthropological museum. Mr. Walter Hough discusses archaeological field work in N.E. Arizona, and gives an account of the Museum-Gates Expedition in 1901, and with this monograph there are 101 plates, some of which are beautifully coloured. The last contribution is by Mr. J. B. Steere, and is a narrative of a visit to Indian tribes of the Purus river, Brazil.

A QUANTITATIVE study by Dr. Paul von Schroeder (described in the *Zeitschrift für physikalische Chemie*) of the setting and swelling of gelatin has led to some interesting observations, which not only throw light on the phenomena of gelatinisation, but also form an important addition to our knowledge of reversible chemical changes. It appears that gelatin solutions undergo two types of change, a non-reversible hydrolysis by which the setting power of the solution is permanently impaired, and a reversible change as the result of which the jelly melts when heated and slowly solidifies when cooled. The setting power of a solution is accurately indicated by its viscosity. If after rapidly cooling from 100° the viscosity is measured at 25°, a low value is obtained which gradually increases until, if the decomposition of the gelatin has not proceeded too far, it culminates in the setting of the whole mass. By measuring the increment of viscosity during one hour it is possible to predict whether the solution will set in the course of the next twenty-four hours. The reverse process by which the gelatin swells and then dissolves in water presents similar points of interest. Gelatin saturated with water has a higher vapour-pressure than water itself, and loses weight in a saturated atmosphere; the difference of vapour-pressure is, however, very minute, and may be compared with that which exists between drops of different sizes, and causes the larger drops of a fog to grow at the expense of the smaller particles.

At a meeting of the Institution of Civil Engineers on December 15 several aspects of the important question of water supply were discussed. Prof. J. Campbell Brown read a paper on deposits in pipes and other channels conveying potable water. Analyses were given of incrustations on iron pipes, showing that these incrustations were due to oxidation of the iron of the pipes, whether wide-

spread or in nodules, and that they were not limited to acid waters, but were common to acid, alkaline, and neutral waters. Investigations were recorded showing that slimy deposits on the inner surface of pipes, &c., were produced by gelatinous and filamentous iron-organisms which grew and extracted iron from the water, and died at one end while they grew at the other. Solid rock particles were entangled in this slime, and binoxide of manganese was deposited by chemical action, and this also was entangled in the mass of the gelatinous iron-organisms. Messrs. Osbert Chadwick and Bertram Blount introduced the subject of the purification of water highly charged with vegetable matter, with special reference to the effect of aëration. They showed that the purification of tropical waters was very difficult; they had found that treatment with iron was efficacious, but the treatment must be more thorough than with ordinary water-supplies. The character of these waters charged with vegetable matters rendered the removal of the iron difficult. Systematic aëration, so as to ensure an abundant supply of oxygen, was requisite. An apparatus had been devised in which the water was caused to flow through perforated plates, emerging in streams of small diameter and exposing so large a surface per unit volume of liquid that rapid absorption of oxygen from the air was made certain.

THE additions to the Zoological Society's Gardens during the past week include two Malabar Mynahs (*Poliopsar malabaricus*) from India, presented by Mr. A. F. Vine; two South Albemarle Tortoises (*Testudo vicina*) from the Albemarle Islands, presented by the Captain and Officers of H.M.S. *Amphion*; two Hybrid Parrakeets (between *Palaeornis eximius* and *Psephotus haematonotus*), four Limbless Lizards (*Pygopus lepidopus*) from Australia, deposited.

OUR ASTRONOMICAL COLUMN.

RADIAL VELOCITIES OF β AURIGÆ.—M. G. A. Tikhoff, of the Pulkowa Observatory, has recently concluded a research on the relative velocities of the spectroscopic binary β Aurigæ, and publishes his results in No. 3916 of the *Astronomische Nachrichten*.

The forty-one plates on which the results are based were obtained by M. Belopolsky, nineteen during the early part of 1902 with a Rutherford spectrocope, and twenty-two at the end of 1902 and the beginning of 1903 with a new Töpfer three-prism spectrograph. The relative velocities of the components are given in a table, which also shows the exact time at which the plates were taken and the interval since the last conjunction, and they show a maximum of 228 km. per second, on March 24, 1902, to zero.

The curve obtained on plotting these results gave 3d. 23h. 30.4m. as the period, and it also indicates that the system is not only a binary one, as announced by Prof. Pickering in 1890, but is made up of more than two bodies. This is confirmed by the spectrogram obtained on January 21, 1903, in which the line H γ is made up of four components, indicating the existence of four separate bodies with different velocities.

M. Tikhoff has arrived at the conclusion that the system is made up of two pairs, each pair consisting of a star giving strong lines and another giving weak lines, and each element making a complete revolution about the centre of gravity of its pair in 19.1 hours. The ratio of the masses of the two groups is near unity, and the proper motion of the whole system as deduced from the magnesium lines at λ 4481 and λ 4352 is -16 km. per second. The epoch of conjunction may be taken as February, 1903, 3d. 10h. (Pulkowa M.T.).

THE "DOUBLING" OF THE MARTIAN CANALS.—In discussing the instrumentality of "contrast" in producing the duplicated appearance of Martian canals, M. E. M.